

Remarks

The instant Office Action dated August 20, 2008 notes the following rejections: claim 23 stands rejected under 35 U.S.C. § 112(2); claims 1, 3, 5-8, 10, 20-21, 23, 25 and 27 stand rejected under 35 U.S.C. § 102(e) over Chudzik (U.S. Patent No. 7,030,481); claims 2, 4, 24 and 26 stand rejected under 35 U.S.C. § 103(a) over Chudzik in view of Kosaki *et al.* (U.S. Patent No. 6,268,619); claim 9 stands rejected under 35 U.S.C. § 103(a) over Chudzik in view of Goldberger *et al.* (U.S. Patent No. 6,538,300); claims 22, 24 and 26 stand rejected under 35 U.S.C. § 103(a) over Chudzik in view of Hsuan *et al.* (U.S. Patent Pub. No. 2001/0005646). In this discussion set forth below, Applicant does not acquiesce to any rejection or averment in the instant Office Action unless Applicant expressly indicates otherwise.

Applicant respectfully traverses the § 112(2) rejection of claim 23. Applicant submits that it is irrelevant what units the depth is measured in because claim 23 does not recite any specific depth, but merely that the trenches extend into the substrate to a depth (*i.e.*, any depth) from the first side of the substrate, as would be clear to the skilled artisan. *See, e.g.*, M.P.E.P. § 2173.04 (“(b)readth of a claim is not to be equated with indefiniteness.”). Notwithstanding, Applicant has removed this claim term, and the issue altogether, without changing the scope of the claim. Accordingly, the § 112(2) rejection of claim 23 should be withdrawn.

Applicant respectfully traverses the § 102(e) rejection of claims 23, 25 and 27 because the cited portions of the Chudzik reference do not correspond to the claimed invention which includes, for example, aspects directed to a single deposition layer of dielectric material on the first and second sides of the substrate, on the conductive material lining each of the trenches, and on the walls of the vertical interconnect. The Office Action fails to identify any portion of the Chudzik reference as allegedly corresponding to Applicant’s single deposition layer of dielectric material. *See, e.g.*, section 11, beginning on page 5 of the instant Office Action. Moreover, the cited portions of Chudzik do not teach that there is any dielectric material on the second side of substrate 200. *See, e.g.*, Figure 4a. Accordingly, the § 102(e) rejection of claims 23, 25 and 27 is improper and Applicant requests that it be withdrawn.

Applicant respectfully traverses the § 102(e) rejection of claims 1, 3, 5-8, 10 and 20-21 because the cited portions of the Chudzik reference do not correspond to the claimed invention which includes, for example, aspects directed to the dielectric material of the vertical interconnect and the dielectric material of the vertical trench capacitor being common material formed from a single deposition layer. The Examiner appears to confuse Chudzik's teachings relating to separate dielectric layers that can be the same type of material with the claimed invention, which has a single deposition layer that forms both the dielectric of a vertical trench capacitor and insulation between a substrate and a vertical interconnect. *See, e.g.*, the Response to Arguments section on page 2 of the instant Office Action. Chudzik simply teaches that the cited two separate layers (*i.e.*, 220 and 3020) could be formed of the same type of dielectric material, not that these layers are common material formed from a single deposition layer. Specifically, the cited portions of the Chudzik reference do not teach that insulating material 220, which separates the conductive material 230 in via 210 from the substrate 200, is the same common material (*i.e.*, part of the same deposition layer) as the dielectric film 3020 of the trench capacitor structures 3010. *See, e.g.*, Figure 3b and Col. 4:13-15. Moreover, Chudzik teaches that the trench capacitors and the through vias are formed in separate processing steps (*i.e.*, insulating material 220 and dielectric film 3020 are formed in separate steps from different dielectric layers). *See, e.g.*, Col. 5:61 to Col. 6:12. As such, insulating material 220 and dielectric film 3020 are not common material formed from a single deposition layer. Accordingly, the § 102(e) rejection of claims 1, 3, 5-8, 10 and 20-21 is improper and Applicant requests that it be withdrawn.

Applicant further traverses the § 102(e) rejection of claims 3 and 25 because the cited portions of the Chudzik reference do not correspond to aspects of the claimed invention directed to the vertical interconnect including a plurality of parallel trenches that are each substantially filled with conductive material. According to M.P.E.P. § 2131, the cited portions of a prior art reference must be arranged as required by a claim in order to anticipate that claim. In this instance, the Office Action asserts that Chudzik's via 210 corresponds to the claimed vertical interconnect (*see, e.g.*, page 3 of the instant Office Action); however, Chudzik does not teach that via 210 includes a plurality of parallel trenches (*see, e.g.*, Figures 3b and 4a). The Office Action then improperly attempts to show

correspondence to the plurality of parallel trenches by citing to another via 410' that is filled with conductive filler 430'. *See, e.g.*, Figure 4a and Col. 6:13-25. The cited portions of Chudzik teach a plurality of vias (*i.e.*, a plurality of vertical interconnects), instead of a vertical interconnect that includes a plurality of parallel trenches that are each substantially filled with conductive material as required by the claimed invention. As such, the cited portions of Chudzik are not arranged as required by the claimed invention (*i.e.*, via 210 does not include a plurality of parallel trenches). Accordingly, the § 102(e) rejection of claims 3 and 25 is improper and Applicant requests that it be withdrawn.

Applicant respectfully traverses the § 103(a) rejection of claim 9 because the cited portions of the Goldberger reference do not teach that a planar capacitor is present on the first side of the substrate. Specifically, the cited portions of Goldberger teach that the second plate of the capacitor is the substrate 102. *See, e.g.*, Figure 1 and Col. 3:19-24. Thus, Goldberger teaches that the substrate 102 forms part of the capacitor, instead of a planar capacitor that is on the first side of the substrate as claimed. Moreover, the Office Action erroneously asserts that Goldberger teaches that the dielectric material (*i.e.*, 104) of this capacitor is part of the same layer of dielectric material as the dielectric material of some unidentified vertical trench capacitor. The cited portions of Goldberger do not mention any vertical trench capacitor, let alone that the dielectric material of this apparently nonexistent trench capacitor is part of the same deposited layer of dielectric material as the dielectric material used in a planar capacitor. Applicant previously presented this argument and requested that the Examiner provide clarification regarding how the cited portions of Goldberger are relevant to the claimed invention, to which the Examiner failed to respond in any manner. *See, e.g.*, M.P.E.P. § 707.07(f) ("Where the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it."). The Examiner continues to rely upon the same portions of Goldberger, without responding to the substance of Applicant's previous arguments and without clarifying how these (essentially unrelated) portions are relevant to the claimed invention as requested by Applicant.

Moreover, the Office Action fails to present a valid reason for the proposed combination of the Chudzik and Goldberger references. This approach is contrary to the requirements of § 103 and relevant law. *See, e.g., KSR Int'l Co. v. Teleflex Inc.*, 127 S.

Ct. 1727, 1741 (U.S. 2007) (“A patent composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art.”), and as discussed at <http://www.iptoday.com/articles/2007-09-nowotarski.asp>. In this instance, the Office Action asserts that the skilled artisan would modify Chudzik to include a capacitor as taught by Goldberger because “capacitors in accordance with Goldberger’s invention exhibit numerous advantages.” Applicant submits that the statements made in the Office Action amount to no more than conclusory statements of generalized advantages and convenient assumptions about skilled artisans. Such statements and assumptions are inadequate to support a finding of motivation, which is a factual question that cannot be resolved on subjective belief and unknown authority. *See, e.g.,* M.P.E.P. § 2142 (“rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”).

In view of the above, the § 103(a) rejection of claim 9 is improper and Applicant requests that it be withdrawn.

Applicant respectfully traverses the § 103(a) rejections of claims 2, 4, 22, 24 and 26 because the cited combinations do not correspond to the claimed invention. Applicant submits that the addition of the Kosaki and Hsuan references fails to overcome the deficiencies of Chudzik as discussed above in relation to the § 102(e) rejection of claims 1 and 23. In at least this regard, the § 103(a) rejection of claims 2, 4, 22, 24 and 26 is improper because these claims depend from either claim 1 or claim 23. Accordingly, the § 103(a) rejection of claims 2, 4, 22, 24 and 26 is improper and Applicant requests that it be withdrawn.

Applicant further traverses the § 103(a) rejection of claim 22 because the cited portions of the Hsuan reference do not teach aspects of the claimed invention directed to the conductive material of the vertical interconnect and the second conductive surface of the vertical trench capacitor being formed from common material of a single deposition layer of conductive material. The cited portions of Hsuan do not mention a vertical trench capacitor, let alone that the second conductive surface of some (nonexistent) vertical trench capacitor and plugs 46 are formed from common material of a single deposition layer of conductive material. *See, e.g.,* paragraph 0030. In fact, the only mention of a

capacitor in the Hsuan reference is in paragraph 0029, which discusses that devices in addition to transistor 38 are formed in substrate 32; however, Hsuan does not teach that any part of this capacitor is formed from common material of a single deposition layer of conductive material, which also forms plug 46. Accordingly, the § 103(a) rejection of claim 22 is improper and Applicant requests that it be withdrawn.

In view of the remarks above, Applicant believes that each of the rejections has been overcome and the application is in condition for allowance. Should there be any remaining issues that could be readily addressed over the telephone, the Examiner is asked to contact the agent overseeing the application file, Aaron Waxler, of NXP Corporation at (408) 474-9068.

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